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(54) Welder's eyeshield having  
optoelectric element e.g. liquid crystal  
element

(57) A welder's helmet includes an  
optoelectric element e.g. a liquid crystal  
element 12 positioned between two  
filter lenses 13. Element 12 is actuated  
to darkness by solar cells 14 when  
subjected to light from a welding torch  
through electronics control module 16.

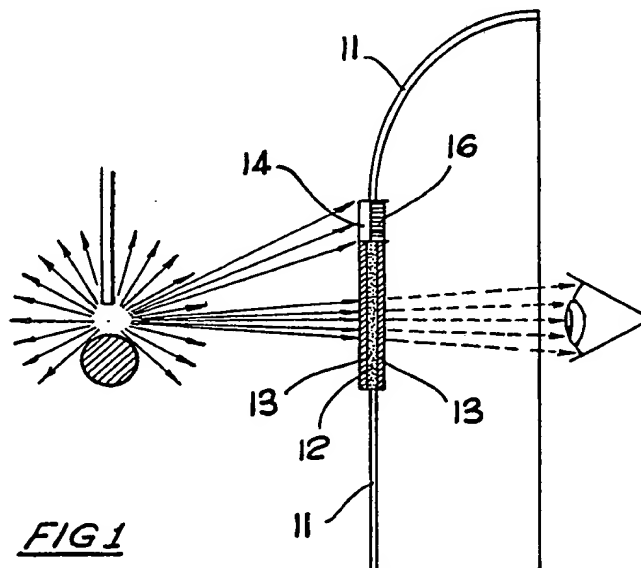
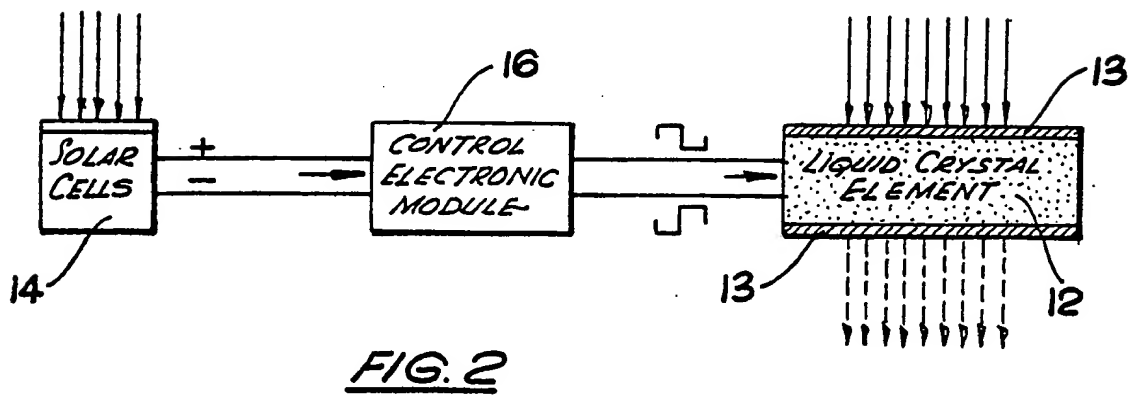
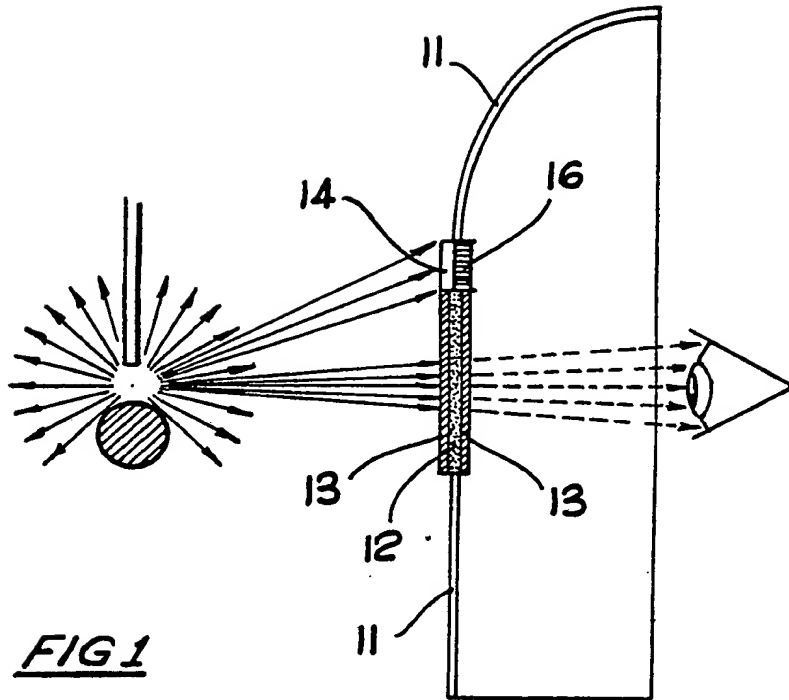


FIG 1



## SPECIFICATION

## Light filter

This invention relates to a light-filtering device suitable for the helmet of a welder.

- 5 The process of gas or electric-arc welding produces a very bright or high intensity light containing a substantial amount of ultra-violet light which on frequent or prolonged exposure can cause serious eye damage to a welder. It is  
10 customary for a welder to start or stop the welding operation with his helmet tilted up so that he can better see what he is doing. During the welding operation the light created by the welding is sufficient for him to see through the dark lens of the helmet. However the frequent, even brief,  
15 exposure to the light is harmful and should be avoided.

Accordingly, an object of the present invention is to provide an improved device for protecting the  
20 welder's eyes.

Another objective is to provide a device that will allow most of the normal light to pass through a light-filtering lens, but which will quickly darken when exposed to the extremely bright light of the  
25 welding flame or electric-arc.

A further object of this invention is to have such a device operate automatically.

At the present time there are welders' masks in use which employ a liquid crystal element as a  
30 filter.

The liquid crystal, used in conjunction with a polariser and analyser filter, forms a screening lens which can be made either dark or transparent by electronic switching. The sensing in such helmets  
35 is performed by a photo-electric cell which triggers the liquid crystal by connecting it to a dry cell battery and an amplifier. The disadvantages of such a device include the weight of the battery as well as the need to keep check on and replace the  
40 batteries.

An object of this invention is to overcome or at least ameliorate the disabilities referred to above by very simple means.

The invention consists of a welder's eyeshield  
45 comprising:

- a headpiece,
- a lens in said headpiece,
- an optoelectric element within or adjacent  
50 said lens controlling the quantity of light passing through said lens,
- photo-voltaic means generating an electric voltage connected to and of sufficient capacity to operate said optoelectric element responsive to an  
55 intensive light source, and
- a control electronics module between said photo-voltaic means and said optoelectric element.

The welder's headpiece can be any of a wide variety of shapes and sizes fitting snugly to the  
60 welder's head, or strapped around the head above the ears or even a pair of goggles or safety glasses supported in the normal way.

The optoelectric element may be a fluid crystal or transparent ceramic cell. One type reverts to the

65 dark state when a small voltage and therefore current is applied and when no voltage is applied becomes almost completely transparent, permitting the welder to see his work without removing the headpiece or goggles.

70 The photo-voltaic means may be a plurality of solar cells such as those manufactured in Australia by Solarex Pty. Ltd. of 5 Bellona Avenue, Regents Park New South Wales 2143 and marketed under the Registered Trade Mark "Solarex". For example  
75 12 of such cells will together produce a voltage of 5.4 volts. By connecting such cells in series sufficient voltage to operate the fluid crystal can be obtained when said cells are exposed to a bright light, such as generated by welding.

80 By way of example, an embodiment of the above described invention is described hereinafter with reference to the accompanying drawings.

Figure 1 is a schematic section of a welder's headpiece in accordance with the invention.

85 In the preferred embodiment shown in Figure 1, the welder's headpiece 11 has incorporated in the face-shield portion in the area in front of the welder's eyes a liquid crystal element 12 sandwiched between two filter lenses 13. The  
90 liquid crystal element is actuated to its dark mode by solar cells 14 whose photo-voltaic energy is passed to the liquid crystal element 12 through electronic control module 16 when impinged upon by a bright intensive light from the flame or  
95 electric-arc of a welding apparatus.

When there is no intensive light shining on the photo-voltaic cells 14, there is no voltage generated by the cells, in which case the liquid crystal element becomes relatively transparent  
100 permitting the welder to observe and arrange his work without removing or lifting the headpiece.

Alternatively, the photo-voltaic cells may be used merely to provide power to the electronics control module and the liquid crystal element  
105 directly or via an accumulator or capacitor. In that case a separate light sensor or photo-electric cell is used to trigger the protective mechanism upon the commencement of welding.

In other embodiments, the photo-voltaic  
110 material may be applied directly to the liquid crystal. It may be inside the liquid crystal element itself, dispersed through it or located in front of the element. It may also be in front or behind the filter material located in front of the  
115 liquid crystal. The photo-voltaic material may be of any suitable thickness and may be transparent or semi-transparent. In this way it may partly or totally cover the viewing area. This provides a particularly compact unit while permitting a relatively large area of photo-voltaic material to be  
120 used, thereby supplying increased voltage and current to the liquid crystal.

As will be readily apparent this invention has the advantage of being lighter than present units,  
125 does not require a battery which need regular maintenance and obviates the need for an operating switch to manually connect or disconnect the battery from the device.

As will be obvious to those skilled in the art, the

headpiece can take the form of safety goggles with liquid crystal elements incorporated in the goggles and controlled in a similar fashion by photo-voltaic cells worn on the person of the welder and positioned to receive the welding light.

#### CLAIMS

1. A welder's eyeshield comprising:  
a headpiece,  
a lens in said headpiece,  
an optoelectric element within or adjacent said lens controlling the quantity of light passing through said lens, photo-voltaic means generating an electric voltage connected to and of sufficient capacity to operate said optoelectric element responsive to an intensive light source, and:  
a control electronics module between said photo-voltaic means and said optoelectric element.
2. A welder's eyeshield as defined in Claim 1 wherein said photo-voltaic means is of sufficient capacity to operate said optoelectrical element responsive only to welding light generated from the flame or electric-arc of a welding apparatus.
3. A welder's eyeshield as defined in Claim 2 wherein said photo-voltaic means is located adjacent said lens and is directed towards a position where welding work would be performed by said welder.
4. A welder's eyeshield as defined in Claim 3 wherein said photo-voltaic means is located above said lens.
5. A welder's eyeshield as defined in any one of the preceding claims 2 to 4 wherein operation of said optoelectric element by said photo-voltaic means is triggered by said welding light.

6. A welder's eyeshield as defined in any one of the preceding claims 2 to 4 wherein operation of said optoelectric element by said photo-voltaic means is triggered by a separate light sensor or photo-electric cell operative in response to said welding light.

7. A welder's eyeshield as defined in any one of the preceding claims wherein said optoelectric element is a liquid crystal element.

8. A welder's eyeshield as defined in claim 7 wherein said liquid crystal element is sandwiched between two filter lenses.

9. A welder's eyeshield as defined in any one of the preceding claims wherein said headpiece comprises a pair of goggles with a separate lens and optoelectric element for each eye.

10. A welder's eyeshield as defined in claim 1 or claim 2 wherein said photo-voltaic means at least partly covers said optoelectric element.

11. A welder's eyeshield as defined in claim 10 wherein said photo-voltaic means is transparent.

12. A welder's eyeshield as defined in claim 11 wherein said photo-voltaic means totally covers said optoelectric element.

13. A welder's eyeshield as defined in claim 1 or 2 wherein said photo-voltaic means is located inside said optoelectric element.

14. A welder's eyeshield as defined in claim 13 wherein said photo-voltaic means is dispersed through said optoelectric element.

15. A welder's eyeshield as defined in claim 1 or 2 wherein said photo-voltaic means is located behind a layer of filter material in front of said optoelectric element.

16. A welder's eyeshield substantially as herein described with reference to the accompanying drawings.